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ENTOMOLOGY.—Some undescribed species of Eristalis from North America in the United States National Museum.¹ FRANK M. HULL, University of Mississippi. (Communicated by HAROLD MORRISON.)

Eristalis aztecus n. sp.

Female: Face considerably projecting. Upper half brownish yellow, lower half and cheeks brownish black, shining; pile of face very long, yellow, of lower occiput, white; cheeks bare. Front and vertex dark brownish, more or less opaque, with dense, very long, reddish yellow pile. Eyes densely long pilose. First and second antennal joints shining brownish orange. Third joint more opaque, brownish orange below and black along a narrow dorsal border. Arista extends to facial knob, light reddish with long plumose hairs on basal half, very slightly and gradually thickened basally. Thorax dark brownish, opaque. Pleurae, same color, shining; scutellum brownish red, faintly shining. Pile of pleurae, thorax, scutellum, light reddish, tending to golden, very long and dense. Second abdominal segment black, faintly shining, an obscure, reddish shining spot, occupying either side. Third, fourth, and fifth segments shining black. Third with a narrow obscure opaque black band on anterior border and again just before posterior border. Pile of second segment abundant, long, very short on third and fourth, practically absent on fifth. Venter shining, the color is an indefinite mixture of light brown and black.

All femora shining, black, save at the tip, pale yellow. A single row of unusually long yellow bristles at regular intervals on the ventral side of hind femora. Pile long and black. Hind tibiae white on basal half. Middle tibiae save at tip, and fore tibiae on basal half pale yellow, otherwise dark brownish. Fore and middle tarsi light reddish; last two joints of fore and middle and all of hind tarsi dark brown. Wings quite hyaline. Stigma brown. Hind tibiae somewhat flattened; no ciliary brush. Length 14 mm.

The type is a female, no. 42076 U. S. N. M., Real del Monte, Mexico, 9,000 ft. (*H. T. Vanostand*).

This belongs to those neotropical species, strikingly similar to *Eristalis* circe Will., in the pronounced light reddish brown coloration and thick shaggy pile of similar color. The ground color of the face is light obscure brown, not shining black and the lower face projects forward less. The shaggy red pile of circe continues to the terminal abdominal segment, where as it is limited to the first and second in *aztecus* and grown noticeably shorter on the second.

It may be noted that this species resembles *fulvipes* Big. in the dilated posterior tibiae and the color of thorax, scutellum, and the pile; it differs in its very hairy eyes, plumose arista, etc. It must be close to Bigot's *E. inca*, in hairy eyes, plumose arista, and dark thorax covered with reddish pile. It differs in front being brown, not black, with thick long yellow hair and absence of long yellow hair on face. *Eristalis aztecus* traces to *distinguendus* in Curran's Key, differing markedly in color and pile.

¹ Received April 16, 1935.

Eristalis circe Will.

Male: Face considerably projecting downward; shining black, covered with very long, pale brownish yellow hair; cheeks bare, shining black. Vertex shining black, covered with similar hair to that on face, likewise covered with microscopic pubescence. Facial prominence inconspicuous. First and second joint of antennae black, shining. Third joint opaque light reddish brown. Arista lost. Eyes heavily long pilose; pile of lower occiput very shaggy, nearly white, upper occiput tending to reddish. Whole thorax opaque dark brown. Thorax, scutellum and pleurae, densely covered with long shaggy reddish yellow pile, tending to golden.

Abdomen light brownish red, second and third segments faintly shining, fourth quite shining. Second segment with a narrow black transverse band along anterior border, widening medially and becoming a median black spot pointed apically; third segment likewise with a median black spot; fourth with a still smaller black spot. Whole abdomen covered with exceedingly long reddish yellow pile. Venter entirely shining black. Hypopygium shining black. Fore and middle femora light yellow save tip, and hind femora shining black. First two femoral pairs with long black hairs. Last femora with long dense hairs arranged as a brush on outer and inner surfaces, the outer reddish yellow except on extreme tip and the inner black; bristles in bristle-row, yellow. Tibia black, basal half of first pair, basal two-thirds of second, yellow, shining. Fore and middle tarsi yellowish brown. Hind tarsi smoky brown to black. Wings hyaline, veins only with narrow reddish brown clouds, which are probably characteristic. Hind tibiae compressed, without ciliary band. Length 14 mm.

One male, Mexico City, Mexico (Juan Muller).

Eristalis fuliginosus n. sp.

Male: Face, cheeks, vertex, front, shining black; microscopic, silvery pile present on all these parts, but most abundant on lower face and cheeks, and here divided by a bare band of shining black; facial prominence large, though not especially prominent, bare. Face and cheeks with sparse, quite long silvery hair. Long black sparse hair on vertex and antennal prominence. Ocelli situated on a distinct prominence. Eyes heavily long pilose, especially anteriorly. Antennae dark reddish brown, microscopically pubescent; arista slender, not thickened, non-pubescent, wiry, light reddish in color. Third antennal joint about one and a half times as long as broad, somewhat pointed apically. Pleurae for most part shining black with sparse long black pile. Disc of thorax and scutellum opaque black, pile thick, but short, growing quite long on scutellar margin, black, center of scutellum with oval, median, opaque yellow spot barely touching posterior margin.

Abdomen black. Second segment opaque, save posterior margins and lateral margins narrowly. Third segment opaque save broad transverse shining black band, narrowly interrupted medianly. Fourth entirely shining; pile on margins of second segment and disc of second and third black, some white pile on disc of second only and on margin of third and fourth and hypopygium. Venter entirely black. All the femora shining black, long black pilose, hind femora heavily thickened; all tibiae shining reddish brown, all tarsi reddish orange brown; pile of tibiae and tarsi light; hind tibiae prominently flattened, a groove on inner surface of apical half. Wings smoky brown on outer half, hind tibiae without ciliary brush. Length 12 mm.

Holotype male, no. 42078 U. S. N. M., Attenas, Costa Rica (Schild and Burgdorf).

This species is similar to *nigripennis Macq.* in the dark coloration, and the smoky wings of the apical half. Distinctive in the yellow spot on scutellum, which is opaque, and the heavily thickened, 'pinched-in' hind femora with glossy brownish red tibiac. The above characteristics likewise distinguish it from the neotropical *Eristalis scutellaris* Fabs. to which it is allied by the slender, bare, quite long arista. The front in profile is peculiarly flattened.

This traces to my species *Eristalis cyatheus* in Curran's key, but the thoracic pattern is not broken up into spots as in that species. From *precipuus* Will., also with red femora and tibiae it is distinguished by the black color of the abdomen. *Eristalis melanaspis* Wied. has a yellow abdomen and its scutellum is similar to this species, but its femora are dark.

Eristalis bistellatus n. sp.

Female: Cheeks black, covered with faint white pruinescense and abundant long yellow har; a bare spot in middle of face just above mouth, oval in shape and shining yellowish brown. A similar bare spot just above antennae. First joint of antennae yellowish brown, shining, remainder wanting. Front dark brown becoming nearly black at vertex; pile thick and lighter brown in color. Eyes densely pilose save on a narrow posterior strip.

Thorax and scutellum opaque velvety black, pile very thick and black. Scutellum equipped with an extra long tuft of pile on each side near the base. Remainder of scutellar margin bare. First abdominal segment black, opaque, with long whitish pile. A large, nearly square, opaque, pale yellow spot on each side of second segment, narrowly separated by black in the middle. Third segment opaque black, fourth segment similar, except for a transverse band in middle of segment, shining black and narrowly interrupted medianly. A similar uninterrupted band on fifth segment. Pile of abdomen, save on fifth segment short, thick, close, black; on fifth segment it takes the form of very long indefinite median, posterior, and lateral tufts. Second segment of venter light yellow with dark brown median spot. Third brownish black, yellowish in anterior lateral angles. Pleurae opaque black, densely black pilose. All the femora, shining black, densely black pilose, the basal half with some sparse, very long pale pile. Middle femora on posterior ventral side with a long brush of exceedingly dense, long black pile. Anterior tibiae shining reddish brown; hind tibiae shining black, quite flattened and with black ciliary brush on dorsal and vertral surfaces. All the tarsi reddish brown, pile golden; hind metatarsus enlarged. Wings hyaline, faintly brownish. Length 16.5 mm.

Type, a female, no. 42079 U. S. N. M., Piches and Perene, Peru, 2000-3000 ft. altitude.

This species is related to *Eristalis pygolampus* Wd. in the large size, dark color, and broad, flat, dark scutellum, but differing in the less metallic abdo-

Fig. 1.—Lateral view of head of *Eristalis bistellatus* n. sp. Fig. 2.—Lateral view of head of *Eristalis circe* Will. Fig. 3.—Scutellum of *Eristalis diabilis* n. sp. Fig. 4.—Scutellum of *Eristalis fuliginosus* n. sp. Fig. 5.—Lateral view of head of *Eristalis atecus* n. sp. Fig. 6.—Figure of posterior tibiae from the side of *Eristalis bistellatus* n. sp. Fig. 7.—Figure of femora of *Eristalis atecus* n. sp. Fig. 8.—Lateral view of hind femora of *Eristalis atecus* n. sp. Fig. 9.—Lateral view of hind femora of *Eristalis atecus* n. sp. Fig. 9.—Lateral view of hind femora of *Eristalis atecus* n. sp. Fig. 11.—Lateral view of hind femora of *Eristalis diabilis* n. sp. Fig. 12.—Dorsal view of hind fenora of *Eristalis fuliginosus* n. sp. Fig. 12.—Dorsal view of hind fenora of *Eristalis fuliginosus* n. sp.





For explanation of Figs. 1–12, see bottom of opposite page.

men, the presence of the two large quadrate yellow spots, as well as other differences as described. It is slightly similar to *Eristalis surinamensis*, Macq.

Eristalis diabilis n. sp.

Male: Front shining and vertex opaque black. Pile of these areas very sparse, about as long as third antennal joint is wide, of a vitreous black color. Face descending, but not markedly and a median stripe shining vitreous black. A broad band, from epistoma to margin of eyes and thence to just above antennae, of silvery pubescence. The same band bears very scattered, long silvery hair. First and second antennal joints shining black; third dark brown, very short instead of evenly rounded, having an obliquely truncated appearance. Eyes dichoptic, thinly brown pilose.

Dorsum of thorax shining black with a bluish tinge, the color obscured by thinly dusted pollen (or pruinescence), apparently without markings of any kind. Pile of dorsum rather abundant, about as long as half the length of scutellum, pale brownish yellow. Scutellum opaque yellow, narrowly opaque black on the sides, pile sparse, long, black. Pleural pile pale. Abdomen black, faintly shining, the third and fourth segments with a central transverse band more strongly shining. An opaque black band on anterior and posterior margins of third and fourth segments; a pale brownish yellow spot on either side of the second segment, wider than scutellum is long, separated from the lateral margins of the segment by a narrow black border which widens as it proceeds posteriorly to about twice its width anteriorly. Segments two, three, and four with narrow yellow posterior margins.

Legs shining black. All the femora normal at the tip, basal third of hind tibiae and fore and middle tibiae more normally, brownish or brownish yellow. Fore and hind tarsi black; middle tarsi brown. Hind femora slightly thickened in the middle, producing a slight 'pinched-in' appearance at the tip. Wings quite hyaline. Length, 8 mm.

Holotype male, no. 42077 U. S. N. M., and one paratype male, Tacubaya, and Mexico City, Mexico, 4–18 (*John Muller*).

This peculiar little species greatly resembles the one I have discussed² under the name of quadraticornis Macq. and which more recently Dr. Curran identifies with meigenii Wd. From meigenii Wd. it differs in the unicolorous thorax, the more widely yellow scutellum, and the absence of yellow spots on the third segment. From texanus Hull it differs in the blackened base of scutellum, and the absence of stripes. All three species are quite small and at least meigenii Wd. agrees in the peculiarly shaped third antennal joint. The present species is unique among North American Eristalis in the dichoptic male, unless the male of texanus proves to be dichoptic which seems likely. E. meigenii might be considered to be very narrowly dichoptic. The present species, diabolis, traces to meigenii in Curran's Key, but is more dichoptic, and moreover, diabolis also has a small, shining, yellowish spot above the antennae, and a transverse depression about the middle of the front. Older authors have applied the name Eristalinus to similar dichoptic species from Europe. The species further resembles meigenii Wd. in the pe-

² Ohio Jour. Sci. 25: 29. 1925.

culiar type of third antennal joint, in size, bimaculate scutellum and general pattern of abdominal markings. The thorax is unicolorous, however, and the scutellum more widely yellow.

GEOLOGY.—*Tentative ages of Pleistocene shore lines.*¹ C. WYTHE COOKE, U. S. Geological Survey.

For countless ages the relative positions of land and sea have been continually changing. Vast areas that are now dry land are floored by rocks deposited in ancient seas. Many continents and islands are fringed by marine terraces that have more recently emerged and whose shore lines can still be traced by means of their abandoned beaches and other features.

It has been the custom in the past to call such emerged beaches and sea bottoms "raised" or "uplifted," the implication being that they attained their present position above sea level by rising or tilting of the land while sea level, the datum plane to which they are referred, remained constant. Although it is undoubtedly true that the emergence of such features in many places is due primarily to movements of the land, yet these very movements must have affected the level of the sea. If upwarp of the crust of the earth at one place is compensated by downwarp elsewhere, the net effect of crustal movements on sea level is nil, provided that all parts affected are beneath the sea or all are above sea level; but if the land rises and the sea bottom sinks, sea level falls; and if the land sinks and the sea bottom rises, sea level becomes higher. The crustal movements that raised the Pacific coast of the Americas and formed the near-by deeps probably resulted in a world-wide lowering of sea level. It seems likely that the dominant direction of change of sea level due to crustal movements during Quaternary time has been downward.

Another factor that influences the height of sea level is the variable size of the polar and subpolar ice caps. This factor has been called glacial control. When the ice caps are large there is less water in the sea than when the ice caps are small. Glacial stages, therefore, are times of low sea level; interglacial stages are times of high sea level. As the earth is now in a state of partial glaciation, the height of sea level due to glacial control is intermediate between the lows of the glacial stages and the highs of the interglacial stages.

As water seeks its level, a variation in the capacity of the oceanic

 1 Published by permission of the Director of the U. S. Geological Survey. Received May 11, 1935.